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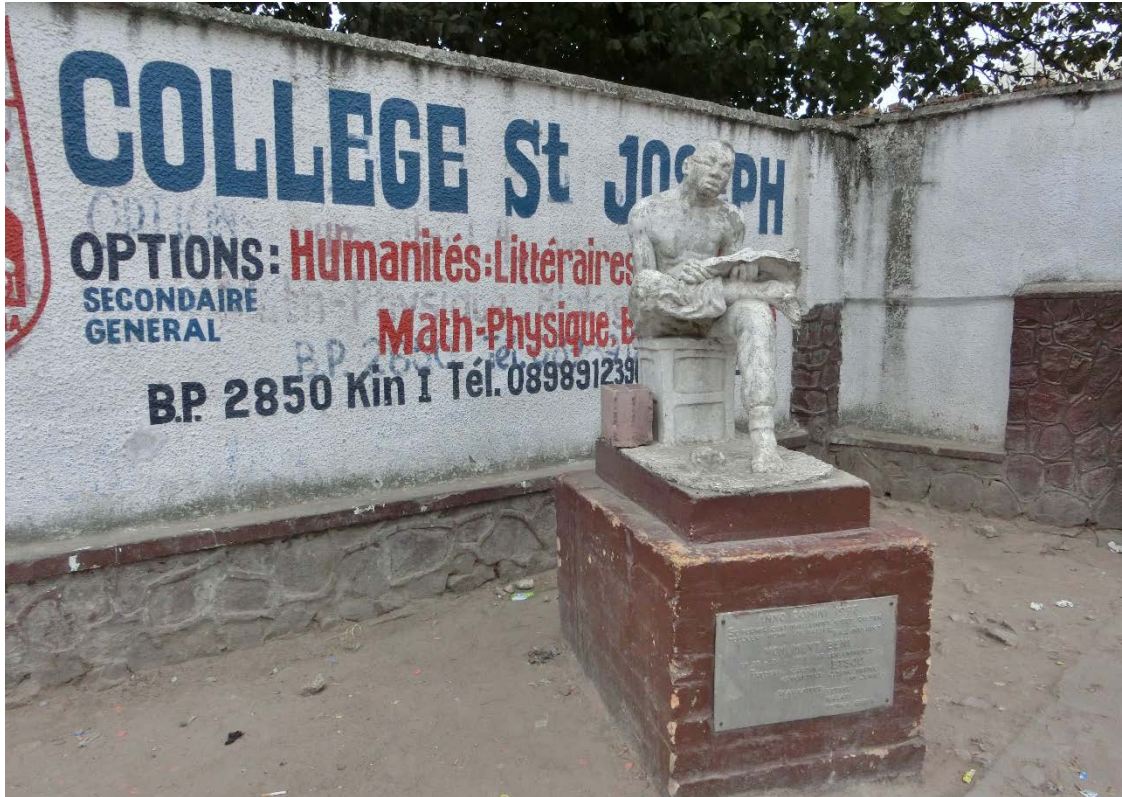


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Democratic Republic of Congo: AET Assessment Report

Reinforcing TVET for workforce and community development in
Katanga: Mining and agricultural value chains

Submitted to the USAID Mission in DRC by the innovATE Project Team

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This document was written as part of a series of InnovATE AET assessment reports. An AET assessment report documents a scoping analysis conducted at the request of a USAID mission. These reports identify gaps in the human and institutional capacity of in-country AET systems. Examples of good practices identified and recommendations for next steps are included in these publications. For more information about the InnovATE project and other publications visit our website at <http://www.oired.vt.edu/innovate>. Contact us at innovateprogram@vt.edu or call 540-231-6338.

Introduction

At the request of USAID/DRC, InnovATE conducted a rapid appraisal intended to assess the technical and vocational education and training (TVET) system in southern Katanga Province (the mining basin) to meet the needs of the workforce and enable alternative agricultural livelihoods. USAID was interested in how to develop agricultural value chains, promote micro- enterprise, and create a potential PPP with Caterpillar (CAT) for reinforcement of TVET training of mechanics and heavy machinery operators. In addition, we investigated the prospects for integrating pupils, particularly girls, who have finished basic education through USAID- supported accelerated learning programs into these technical schools. USAID's goal is to prepare young men and women from Katanga Province to undertake their own microenterprises or to find employment in local industries (e.g. mining, equipment repair, construction, agriculture) to reduce poverty and provide livelihoods. This will be accomplished by improving the TVET system to better match training with demand, and creating diverse economic drivers, with a focus on agri-business. Target groups include women and girls, and members of disadvantaged or vulnerable groups.

The objectives of this rapid assessment are:

- Describe the primary human capital needs and potentials for agribusiness and industrial workforce development including the informal sector.
- Assess the current status of the vocational education system in Katanga.
- Propose possible project designs or activities that could achieve USAID's stated development objectives.

Methodology

The methodology for examining the TVET/jobs interface and identifying the alternative ways of providing needed agricultural and mining vocational skills involved site visits and meetings with 22 different individuals and organizations. This wide range of stakeholders included four international donors, four DRC ministry offices, six secondary schools with a TVET focus, seven private sector entities, and one research institution (see Appendix 1). InnovATE's approach to these conversations involved:

- 1) an overview of the provincial level enabling environment, including support from the national level;
- 2) characterization of TVET institutions in Katanga that could provide agricultural, industrial, and entrepreneurial training and education;
- 3) characterization of relevant mining community and the agribusiness and service sectors that support it; as well as associated value chains; and
- 4) a gap analysis diagnosing the needs for human capital in the agribusiness sector that brings the previous two together.

Data collection for these four components took place over the course of two and a half weeks during August 2014 in Kinshasa and the Lubumbashi region through visits with various actors and key informants. Recognizing gender differences in access to the full range of training opportunities, and entrepreneurial and employment career paths was integral to the process. The report begins with a description of current employment opportunities for the men and women of southern Katanga province. Potential options for value chain development are summarized. This discussion is followed by an analysis of the current strengths and weaknesses of the TVET system, spotlighting three leading institutions. The report ends with a menu of recommended options that USAID/DRC might pursue with respect to public-private partnerships to reinforce community and workforce development in mining and agriculture.

The labor market for men and women in the Katanga mining basin

The labor market in southern Katanga is focused around mining and this sector offers the best prospects for employment. However, the majority of the population are subsistence farmers, and approximately 90 percent work in the informal labor market. The informal sector includes artisanal mining, construction, agriculture, small commerce, charcoal production and other activities. Few women are employed in the mining industry and they are more likely to work in the informal sector than men, especially in commerce and agriculture. Women and men have similar rates of employment (63 percent vs. 60 percent men), but earn less per month (\$19 vs \$32 USD) (UNDP 2009).

Mining

Mining is critical to the economy and labor market of Katanga. The industry is concentrated in the south of the province in the districts of Kolwezi and Haut-Katanga. Copper and cobalt are the two primary minerals mined. Katanga was responsible for half of the world cobalt production in 2010, and the largest mine Tenke Fungurume Mining (TFM) accounted for approximately 30% of the DRC's GDP. Mining jobs are highly desired by the local population and there has been a large migration into the region seeking work. Mining makes a contribution to employment through three channels: direct employment, backward and forward linkages and ancillary services, and fiscal revenues that are reinvested in livelihood support activities.

There are several large mining operations in the province. The Glencore mines (Katanga Mining and Mutandi Mining) employ almost 20,000 people, and TFM employs about 7,500; between one-half and two-thirds are contract workers. Mines employ general mechanics, auto mechanics, truck drivers, electricians, plant operators, welders, security personnel, engineers, laboratory personnel, IT specialists, and administrators. The skilled jobs in highest demand at the mines are electro-mechanics, heavy machine operators, industrial and plastic welding, pipe fitting, diesel mechanics, instrument technicians, and financial administrators. Although foreigners account for less than 5% of employees in most mines, they fill highly skilled positions that cannot be easily replaced by the existing workforce.

TFM has a low turnover rate and the General Manager believes that they have a "sound and solid" workforce and will not need to hire skilled workers on a large scale in the near future. However, the demand for mining related skills will remain high in Katanga with new mines

opening and existing mines expanding. During initial construction and expansion activities thousands of lower skilled temporary workers are hired.

A variety of other jobs are linked with the mines including construction, food service, security, equipment maintenance, and cleaning services. There are very few women working directly in the mines, but more are employed in cleaning services and administration activities. A national law prohibiting women from working night shifts, makes it difficult for mining companies to hire women for the typical rotating shifts of equipment operators.¹ TFM would gladly employ more women as fork lift and machine operators due to their better safety record.

Equipment maintenance and repair is a rapidly growing industry tied to mining. Congo Equipment, the largest mining equipment company, has been hiring 100 people a year for the last seven years and they predict this demand to continue into the future. There are currently not enough high quality graduates of TVET schools to meet their needs, and additional training is necessary in language, math, writing, appreciation of safety, and basic use of hand tools before they can even start an apprenticeship.

The population around mining sites in Katanga is increasing rapidly with people drawn by the possibility of regular, salaried employment with mines. There are not enough formal jobs in the mines, and many of the new migrants take up artisanal mining or charcoal production. Artisanal mining accounts for the majority of current mineral production, with some estimates as high as 90 percent. The average age of the population in the region is 22 and many are unattached young men. Women work in and around artisanal mines-most often as processors of raw material, transporters or traders, as well as informal service providers to the mines in activities ranging from catering to prostitution. Single, divorced or widowed women make up more than one-third of the female artisanal mining population. About three-quarters of the women surveyed by PACT in Kolwezi had been working in artisanal mining for less than two years, which suggests that working in the artisanal mining sector is opportunistic and transitory, at least for women. Almost all women interviewed for the study said they would quit if they had the economic means to do so. Child labor, especially in artisanal mining, is common.

Agriculture

Most Katangans are small scale farmers oriented towards subsistence production rather than commercialization. There are a couple of large commercial farms in southern Katanga, but they employ only a small proportion of the rural population and there are very few jobs in agro- processing. Common crops grown by rural households are maize, cassava, peanuts, and beans. Horticulture crops such as onions, garlic, egg plants, tomatoes, spinach, potatoes, and peppers are also grown by rural households. Use of plows, pesticides, improved seeds, and fertilizers, is low. Although there is high potential in agriculture in Katanga, production is declining and most of the food is imported from Zambia. In the past the province produced a large number of agricultural goods including maize, milk, beef cattle, pork and chickens. Mining is preferred over agriculture due to the promise of higher incomes and regular salaries, whereas livestock raising, fishing and agriculture are more commonly practiced outside of the mining corridor.

¹ There is some uncertainty about whether this law was recently repealed.

Some farm households participate in out grower schemes run by mines or large commercial farms. These programs typically feature extension services, in-kind loans for initial inputs, and a guaranteed buyer. TFM claims to have great success with their out grower program, substantially increasing yields and is contemplating a Farm School to enhance the grower skills. Although there is little data available it is assumed that more women are involved in the agriculture sector than men, as men are lured away by mining jobs. A PACT study in Katanga found that women were more open to agriculture livelihoods than men, and when they were given access to inputs, training, and market linkages, they were able to successfully transition from mining to farming.

Future job prospects

Formal sector employment will likely remain strong in the mining and equipment industry, and related services such as transportation and construction. However, pressure to end artisanal mining is strong, and modern mining is not sufficiently labor-intensive to generate the scale of jobs that would be needed to absorb these workers. In southern Katanga there is a pressing need to generate alternative economic drivers to provide jobs and income for former artisanal miners, new migrants to the area, and communities resettled by mining activities. There is a high potential for more jobs to be created in various agro-businesses and agro-processing operations. Information technology is another emerging field of employment.

Small and Medium Enterprises (SMEs)

Self-employment is rapidly expanding in Katanga driven by small and medium enterprises (SMEs). SMEs include: brick making, fencing, furniture making, vegetable growing, painting, gravel making, construction, small restaurants, beauty salons, telephone credit shops, and charcoal production. Women are highly engaged in most commercial activities, especially those related to agriculture. In urban areas women have small restaurants, salons, commercial gardens, sewing shops and also make wine, soap, and raise chickens. The lack of credit is a major constraint for small businesses and only 17% of microenterprises have bank credit. Lack of business skills and technical assistance hold back small business development. Successful development will require increased entrepreneurial capacity. The following section identifies a wide range of potential opportunities where that capacity might be exercised.

Potential Value Chains for Local Employment

Field Crops

Maize

The maize value chain has been targeted by the provincial government as a strategic crop, but local farmers are challenged to produce at levels competitive with neighboring Zambia, where their agriculture sector is highly subsidized. It is estimated that 80 percent of local consumption is imported, and that large markets in both Kasais are supplied through Katanga. Agricultural investment is limited by national law limiting foreign ownership of farm land to 49 percent.

The chief constraint mentioned is the lack of quality hybrid seeds, followed by the need to import fertilizer. A poorly developed rural road system and lack of credit also constrain production. Nevertheless, the governor has required mining concessions to plant and harvest 500 hectares each. The companies appear to have complied and willingly support the initiative through direct production or support to local farmers. In some cases, the mines, working through their social funds, also provide extension services and inputs to farmers. However, production still does not come close to meeting the domestic consumption needs; nor is it truly competitive. In addition, some farmers may supply local breweries with maize. Alternatively, there is the potential, and initial discussions about, building an animal feed supply chain combining maize with cowpeas and soybeans.

Local production could be increased, but this would require considerable capital to import the seeds and other inputs necessary. It is unlikely that maize production will be competitive without large scale mechanization of production. Only a few commercial farmers have the land resources and those that do appear to be consolidating production from neighboring small farmers to achieve scale in milling and storage.

Manioc

Manioc is a staple crop grown extensively by local farmers for consumption. Building a value chain around this crop involves transformation techniques and technologies that do not seem to be available in the region. Technology research and development will be required. A FAO variety has been tested but was not successful. Two local varieties are being promoted by the NGO, *Bureau Diocésain de Développement (BDD)*.

Rice

The rice value chain was mentioned a few times, but we found little evidence that it was significant in the mining zone, and no information on local production constraints. Besides contributing to consumption, rice could also be supplied to breweries or included in animal feed.

Cowpeas, Soybeans, Common beans, and Vigna

Legumes appear to be a farming diversity component (usually for cash), but were rarely mentioned by the project managers we interviewed. One local NGO countered falling bean yields by replacing beans with a new, but similar crop: vigna. Beans appear to have some local market value and could become a component of animal feed, but as yet there is little information, and consequently, little interest in pursuing these nutritional crops.

Peanuts

Peanuts were rarely mentioned as a value chain, but are often sold by women along the side of the road and the *Centre de Recherche Agro-Alimentaire (CRAA)* is experimenting with peanut butter processing at a small scale. Commercial production was tried in one project, but was not successfully sustained. Peanuts are being imported into the region as few hectares appear to be planted. Seeds, fertilizers and tools were also indicated as impediments to production.

Sunflower

Sunflower production was mentioned twice, but both experiments ended in failure. The issue seems to be that they do not have quality seeds adapted to the region.

Horticulture

Tomatoes

Tomatoes were the most commonly mentioned value chain. They are grown extensively in the dry-season and provide a steady source of income for those who produce them. TFM buys locally for their canteens. Many feel that so much is produced that conservation/transformation into tomato paste or powder is the next step. However, no one mentioned an investment in this transformation yet. There is likely to be some entrepreneur who tries this in the near future.

Potatoes

Potatoes have an urban market, but production seems to be limited by quality seed potatoes. Research is being done, but it is not clear that a commercially viable solution is yet available.

Carrots, cabbage, onions, celery, amaranth, eggplant, leek, garlic, spinach, peppers, sweet potatoes

These horticultural crops were all mentioned and seen in the market place. Little is known about scaling them up or transformation/conservation. The GlenCor cooperatives are planning to make sales to their local catering service as well as to supermarkets in Kolwesi. There is likely considerable room to increase production, but once larger scale production occurs pest problems could arise. As yet, no one mentioned pests or diseases.

Livestock

Poultry

There may be potential for local production of poultry, both meat and eggs. There is certainly sufficient demand for these products. One local entrepreneur is engaged in this activity and building the components of the chain (incubator/hatchery, sales of eggs and chicks, feed sourcing, adult chicken sales). He mentioned he was constrained by poor infrastructure for his operation (electricity and water) and the lack of a network of farmers from which to buy feed.

Fish-farming

Fish farming was mentioned a couple of times and fish were marketed along the road. Although no one told us anything about an actual aquaculture installation or even plans to build one, we heard of some fish farming in the region.

Pigs

Pork production seems to entice a number of people, but success seems difficult to achieve. Disease quickly decimates a herd. Animal hygiene practices would have to be developed quite extensively.

Forest Products

Charcoal

Although no one discussed this important value chain, it appears to be a steady source of income for a large segment of the population. This production is particularly significant during the agricultural off-season and is leading to substantial degradation in the region.

Status of TVET in Katanga

There is a long tradition of technical and vocational schooling in Katanga, driven by the need to supply graduates for skilled positions in the mining industry. Most schools are public, but some technical schools are private, and whether public or private often operated by church organizations. The former government mining company, Gécamines, manages 11 technical schools with a total of 4,103 students enrolled. In total there are 832 secondary schools in Katanga, with approximately 213,267 students. Girls make up a total of 42 percent of secondary school students, but their numbers are much lower in some technical schools. For example, in the Gécamines technical secondary schools girls make up only 30 percent of the students.

Although most secondary schools offer technical subjects, the range of courses is narrow, and most schools only have one or two courses available. Of the total of 47 subjects listed by the Katanga Provincial Education of EPSP (primary, secondary and professional education), 20 are not taught in any schools. The most common subjects offered are: accounting, general mechanics, sewing, electricity, IT and electronics. Fewer than 1,000 students are enrolled in the other subjects offered. Agriculture is offered in 21 schools, with a total of 621 students enrolled. In some subjects, such as accounting and IT there is some gender parity, but nearly all students in the mechanical, electrical and construction courses are male (See Appendix 2). Female students are the majority in sewing.

The *Certificat d'Ecole Primaire* serves as the basis for admission to secondary school. Basic skills needed at the beginning of secondary school include: literacy (reading and writing), numeracy, basic decision making and problem solving, and results oriented abilities. The accelerated learning programs (ALP) provides little support to ease the transition from primary school to employment. The ALP school catch-up program which provides basic training to move children through primary school in three years, as opposed to six. The program targets poor and vulnerable youth between the ages of 9-15 (a majority of whom are girls) whose parents do not have the resources to pay for their education. As such, ALP participants complete primary school with core skills, but without further outside resources are left with few options. Gaining salaried employment requires completion of secondary school. In terms of increasing the success of small agribusiness development, ALPs do not provide women (or men) with the necessary skills to access or make use of micro-finance as it is currently organized. Further training or education will be required.

A second, smaller stream within the ALP program targets youth over the age of 15. Here the pupils learn a trade while focusing on functional literacy. The International Rescue Committee that implements this program mentioned that at one stage there was an add-on program with *Office de promotion des petites et moyennes entreprises* (OPEC) that helped the school leavers write a business plan to set up their own small businesses using the skills they had learned. The best business plans were given a small amount of "tools of the trade", e.g., sewing machines or tool kits. There have been no follow-up studies to determine the fate of these ALP graduates. No studies have been conducted to ascertain if these microenterprises started by the ALP students remained viable, grew, or collapsed. It should be noted that the capacity of the entire program at all the Katanga centers is today less than 4,000 individuals.

After primary school, secondary education takes four to six years depending on the cycle (short and long). The program is divided into lower level secondary education, where all students receive common subjects, and upper level secondary education, which may be general or technical. A *Brevet* (in area of specialization) is awarded at the end of the *Cycle Court* (Short Cycle) program. Student in the humanities or *Cycle Long* (Long Cycle) must sit for the *Examen d'Etat* (State Examination). Passing the *Examen d'Etat* is necessary to proceed to higher education.

A new government policy has called for the conversion of a majority of secondary schools to technical schools. From a theoretical standpoint, this change is positive, but it will be difficult to meet the practical challenges that this policy entails, including finding qualified teachers and providing the necessary facilities and equipment to outfit technical schools.

Like elsewhere in DRC, secondary technical education in Katanga has been unresponsive to the needs of the labor market. Some of the skills that are lacking in secondary school graduates: planning, management, social and interpersonal communication, facilitation, critical thinking, food preservation and processing, marketing, leadership, business management, income generation, entrepreneurial, and awareness about social, political and legal institutions.

Common challenges identified in TVET schools include:

- The lack of relevant, updated tools, technology and equipment (computers, hand tools, heavy equipment, labs, etc.)
- An older teaching staff that has not had opportunities for retraining
- Inadequate revenues from government, student fees, businesses to improve schools
- Low teacher salaries
- High turnover of teachers
- Lack of, and frequent cuts, to water and electricity
- Lack of entrepreneurial training
- Lack of an adequate agriculture curriculum that includes courses on agribusiness and agro-processing
- Students lack the basic foundation of language, reading/writing, and math skills for success

TVET and Agriculture

Although the demand for mid-level skilled agricultural workers is expected to increase, the relation between the employment market and education is weak. Current efforts by the *Ministère d'Education Primaire, Secondaire et de Formation Professionnelle* (MEPSFP) and *Cooperation Technique Belge* (CTB) have resulted in an improved agricultural curricula building on the European *Approche par competences* (APC), as well as improving the physical facilities, computer technology, handbooks and other teaching materials, and teacher training, in some schools. In the process, the number of training areas was reduced to six: agriculture and forestry; livestock husbandry and animal health; agricultural mechanization; processing of agricultural products; basic nutrition; and horticultural

production². However there are only 21 secondary schools which actually have agriculture courses and none have lessons on agri-business or micro-enterprise development.

Agriculture programs in secondary school face some unique challenges: limited access to land and other agricultural resources for useful demonstration plots and hands-on practices, very few teachers trained in the new approaches, a lack of partnerships with the private sector for internship opportunities, and the absence of entrepreneurship and revenue generating orientation.

TVET and Mining

Southern Katanga has a long and distinguished history of education for the mining industry (see Appendix 3). Unfortunately, the educational system has decayed over the past three decades. The facilities are old and in disrepair. The permanent faculty are retiring and being replaced by temporary contractual employees (*vacataires*) who often leave teaching for better employment in the mines. The repeated complaint is that the equipment is out of date and needs to be replaced if students are to gain the practical instruction they need to become successfully employed in the mining industry. What follows is a description of three leading technical secondary schools in the mining basin characterizing skills development opportunities in the sector.

Institut Technique de Mutoshi (ITM)

The *Institut Technique de Mutoshi* (Kolwezi) was created in 1953 to meet the needs in technical staff for Gécamines. At the beginning, it was run by the Salesian Fathers who left a few years later and started a similar school in Lubumbashi that became *the Institut Technique Salama de Lubumbashi*. Of all the technical and vocational schools in Kolwezi, Mutoshi is the best known. It has four sections in the long cycle: general mechanics, electricity, electronics and industrial chemistry. It has the only industrial chemistry program in Katanga. About 20 percent of the student population is female, and the majority of girls are found in industrial chemistry and electronics. Among teachers, four out of 42 are women.

Until 1986, shortly before the great depression and a financial crisis at Gécamines, the bulk of the graduates of Mutoshi were directly hired by this mining company. Since then, the rate of hiring commitment has become very low (less than 10%) despite the flourishing of mining companies in the region. However, the reputation of the school at the national level has remained more or less intact. The National State Exam results are consistently among the best in the country for secondary technical sections.

With regard to current viability challenges, Mutoshi suffers from exclusive dependency on Gécamines for its administrative and operational functions, and is thus unable to be flexible or innovative in potential future initiatives to improve training. Teacher salaries are inadequate and many teachers leave at the first opportunity to join mining companies or other related businesses. To fill this gap, the school employs part-time teachers (not on Gécamines' payroll) whose job security is not guaranteed. In order to keep them, Gécamines has increased school fees from \$60 to \$96, creating the fear of decline in the number of students and thus revenues this year.

²There is some discrepancy between lists of new subjects that will need to be verified. This list is from the VVOB website describing their work.

School buildings are very old, but well built. Teaching materials, technology, and equipment are outdated and not suited to current workforce needs. This is also true of curricula (program) taught. These two reasons explain the reluctance of companies to hire Mutoshi graduates. Efforts are on-going to secure internships with companies such as TFM, Kamoto Copper Company (KCC) and Congo Equipment in order to improve skills demanded by the labor market.

Everybody we talked to agrees that strengthening support for training/internship in partnership with mining companies near Kolwezi should be encouraged in order to increase the competitiveness of the graduates of Mutoshi. Gécamines, it is hoped, will overcome its woes and help Mutoshi with resources, vision and leadership to adapt to the realities of the job market.

Institut Technique Salama (ITS)

The Institute Technique Salama is a technical private school belonging to the Congregation of the Salesian Fathers of Don Bosco. At the beginning, the school mission was to produce skilled young people and meet the demand for factory workers and other skilled staff for companies in Lubumbashi, including Gécamines and the SNCC using short cycle training.

The school provides long cycle baccalauréat (BAC) for the following sections: general mechanics, mechanics tools, auto mechanics, electricity, electronics, and printing. All these sections are reserved for boys but the school is working on the possibility opening the doors to girls introducing them on a year-by-year basis from the primary level on up. However, there are no female teachers, and only four women in the administration. There is an average of nearly 1200 students per year.

Although the rate of employability of graduates of Salama still remains low, the school has a good reputation among local companies. Nevertheless, some companies like Congo Equipment and KCC mentioned that they must do short courses to raise the level of graduates to enter their training programs. Despite an aging equipment base, their materials and equipment appear to be used and in better condition than those of other technical and vocational schools we visited.

Buildings and equipment are in good condition and convey a sense of organization and purpose.

The school is sustained mainly from fees paid by the students (a little over \$650,000 annually), in addition to revenues from car repairs and printing (nearly \$4,000 monthly). The school occasionally receives grants from the Provincial Government, some private companies (TFM, CAT, etc.) and the CTB.

The potential for Salama appears to be immense and this school currently plays a leading role in the re-launching of the technical and vocational education and training (TVET) in the province of Katanga and throughout the country. Provision of selected equipment and the realization of a public-private partnership could increase the competitiveness of the graduates of Salama.

Collège Technique et Professionnel Mwapusukeni (CTM)

This school was built by the Governor of Katanga and his wife and handed over to Jesuit Fathers to run as a private institution. It opened its doors in September 2013. The school plans to have

three levels: kindergarten, primary and secondary. In 2013, it had a student body of 230 pupils, including 41 girls. The Faculty so far has 16 members, including four women.

This year CTM will offer instruction in three technical sections: automotive, metal construction, and industrial electricity. The buildings are brand new but the workshops are not yet equipped; they are seeking additional donor support for equipment and supplies. The school envisions organizing classes in vocational specialization for plumbing, welding, electricity, and IT in consultation with local companies. This flexibility of career and technical education is new and unique in the country.

Given the administrative organization and rigor of Jesuit schools and the private status of Mwasupukeni, the leadership feels they have room to maneuver and adapt their curricula to the needs of businesses hiring their graduates. One additional concern is whether students from poorer families will be able to pay the high school fees of \$80/month. The school believes that this rate is needed as it will allow them to pay a decent salary to teachers and curb their flight to the private companies. They emphasized that they are “not a business”, unlike other technical schools that use their facilities and students to generate income for businesses attached to technical courses.

Next Steps

This rapid assessment has analyzed key dimensions of the technical and vocational education and training (TVET) system in Katanga province. A key challenge lies in overcoming the low-level of basic education among the populace for which accelerated learning programs have not compensated. The following list provides a menu of options to enable USAID to build a scalable model to strengthen workforce development, particularly focusing on women and youth. First, the opportunity for initiating a Public/Private Partnership (PPP) between USAID, Caterpillar and local institutions is endorsed and specific actions to move forward suggested. The remaining options outline elements of a plan to strengthen the TVET system by establishing a model secondary school that will stimulate the development of agribusinesses to diversify the economy and provide alternative livelihoods integrating certificate courses for non-secondary students.

Food processing has been identified as having the potential to increase employment as well as support sustainable small and medium enterprise development. In addition to food processing, other specialty skill sets will be considered for scaling up this model technical secondary school across the Katanga mining basin. The InnovATE consortium has the technical know-how and contacts to provide back-stopping technical assistance and enhance South-South collaboration.

Recommended Actions

1. Move forward with implementing a PPP between Congo Equipment and USAID/DRC to provide mechanics and machine operator training through improved infrastructure, equipment and curriculum at the Salama School to meet the need for qualified employees within the mining sector.
 - a. Congo Equipment is prepared to adapt an industry training manual to conform with DRC educational standards, and to contribute to the review and revision of

technical school training materials according to the competencies approach of the Ministry.

- b. USAID can provide advocacy and political support for the project with the respective governments and ministries, assisting the project teams where necessary in facilitating official matters.
 - c. The original SIDA/UNIDO proposal provides a solid framework to move forward.
 - d. Coordination with the Ministry and the CTB programs will be required to avoid duplication of efforts.
 - e. Consultancy on matters such as gender strategies or partnership frameworks, where deemed appropriate could be provided.
 - f. Infrastructure development will include building a wall around the school to provide security, finishing the dormitories, and upgrading the provision of water and electricity.
 - g. It is expected that a partnership with CAT to improve the Institut Technique Salama will lead to additional funding provided through the Corporate Social Responsibility branch of CAT to help finance other economic growth and agricultural interventions.
2. Conduct a design study to set up TVET secondary school at TFM New Town with linkages to food processing industry and research partners.
- a. Assess the feasibility of establishing food processing facility in a new industrial park at TFM. Currently production of horticultural products is increasing to a level where a steady supply for processing could be attained. As part of the assessment, it will be necessary to determine which value chains can be most effectively mobilized in the short term.
 - b. Assess what will be required to most effectively adapt DRC's secondary school agricultural curriculum for an agribusiness and food processing emphasis, including student-centered pedagogical practices. The official DRC TVET curriculum in agriculture was recently revised in collaboration with the CTB and appears to be consistent with this emphasis.
 - c. Assess how to leverage the proposed Farm School for complementarities with secondary school internship/experiential learning options and short-term certificate training possibilities. Certificates could be offered to both secondary school students and to individuals already working in the informal sector as well as for those unable to complete secondary school. OPEC programs might be leveraged to assist in this regard.
 - d. Determine strategies for increasing girls' participation in traditional and non-traditional secondary school programs in support of agribusiness and industrial food processing.
 - e. Assess how to target interventions to reach the most vulnerable, and potentially disruptive groups, so that economic growth and opportunities are more inclusive.

Identify the potential for conflict associated with changes in agricultural and mining communities.

- f. Determine the potential for establishing a viable applied research program in food processing at Centre de Recherche Agro-Alimentaire (CRAA). The CRAA has an excellent (although in some disrepair) set of equipment for training at its Lubumbashi site. This could provide a foundation for scaling up the food processing industry across the province and providing a research basis for sustainable expansion of the industry.

Based on the above study, the following elaborates a range of components for future options:

3. Establish a model TVET secondary school in TFM's New Town with an emphasis on the food processing industry. This model would consciously integrate private sector training needs and an institutional structure replicable across the mining basin.
 - a. Develop a governance system that integrates local businesses with academic leaders, government, and NGO economic development programs.
 - b. Establish instructional programs in agriculture, information technologies, mechanics, industrial chemistry, and electronics (following DRC curriculum). A secondary school for New Town will involve providing a range of educational options for residents. Other options may also be worth considering.
 - c. Introduce certificate programs in agribusiness, agronomy, food processing, leadership, conflict management, and entrepreneurship for increased employability of graduates. Work with OPEC and *Institut national de préparation professionnel* (INPP) to scale-out these programs.
 - d. Provide instructors with training in improved pedagogical approaches. Short- courses will be conducted to increase instructor skills and provide them with tools to encourage more active student-centered learning.
4. Develop food processing facilities in the New Town industrial park and other potential sites in the mining basin (e.g., KCC).
 - a. In collaboration with TFM, develop a model food processing facility in support of the secondary school agricultural program.
 - b. Conduct a financial and feasibility analysis to evaluate a set of agricultural value chains. These could include among other products canned tomatoes, fresh eggs, poultry, potatoes, amaranth, and/or carrots)
 - c. Link TFM with food processing industry representatives and provide technical assistance to grow this industry and associated agribusinesses.
5. Build knowledge and skills in processing and packaging of key agricultural products (e.g., tomatoes, peanuts, animal feed, potatoes, etc.).
 - a. Reinforce CRAA ability to conduct research on these transformation processes. Quality assurance and food safety are the key to the food processing industry. Meeting standards and being able to effectively demonstrate consistent quality is integral to achieving and maintaining market access.

- b. Repair and provision the CRAA laboratories. CRAA has two laboratories. One which provides the basis for teaching and research on food processing processes. The other is the quality control laboratory.
 - c. Establish a collaborative research program with UNILU food science researchers, CRAA scientists, TFM New Town secondary school teachers, and TFM Farm School growers. Horticultural production is dynamic. New varieties and new pest challenges are constantly arising.
 - d. Establish South-South collaboration, in particular, opportunities to benefit from the experience and successes of the *Institut de Technologie Alimentaire* (ITA) in Senegal with whom InnovATE partner institutions have close ties.
6. Provide advisory and technical assistance services to agricultural entrepreneurs and growers working with the Farm School.
- a. Develop and teach short-courses for certificate programs. Teaching materials could be leveraged from the secondary school curriculum and packaged for agricultural employees, growers, and advisors.
 - b. Design and implement short term training and certificate courses in agriculture for local people that were not able to continue their education, especially if coupled with micro-credit.
 - c. Provide advisory services for both food processing and agricultural production. These services could be set up complementary to or in conjunction with existing agricultural extension agents working for TFM.
 - d. Develop mined-land reclamation programs to establish new farms.
 - e. Collect information and data on emerging problems and challenges from food processors and growers. This information could easily become the basis for a competitive research program to develop solutions to problems before they become overwhelming and be incorporated as case studies into the curricula.
7. Establish training programs for women at the Farm School following a Farmer Field School (FFS) approach. This program should be developed in collaboration with on-going agricultural support efforts.
- a. Assure access to land for agricultural production
 - b. Provide extension agent training-of-trainers (South-South collaboration) in FFS
 - c. Work through an entire growing season providing training in:
 - i. agronomic production techniques; and
 - ii. cooperative and agribusiness management.
 - d. Provide assistance in connecting with local markets.

Expected Results and Impacts

This set of options will create synergies to increase the economic opportunities for Katanga youth and enable an environment that is more attractive to investment in the agriculture sector.

Building public/private sector partnerships will not only reinforce the mining industry, but assure that Katanga households are directly benefiting from the mining sector, not as beneficiaries of

social programs, but as integral partners in the local economy. Synergies between these program options can be easily scaled to the regional level as profitable opportunities emerge.

Diversifying the local economy by increasing the competitiveness of the agricultural sector is a critical component in reinforcing community livelihoods and reducing the potential for conflict. Through this multi-pronged approach, InnovATE specialists can strengthen both the workforce and increase the application of new technologies in agriculture. Key indicators of success will be the number of woman entrepreneurs who begin working in agribusiness, the ability of the agricultural sector to generate income and jobs for local households, employer's satisfaction with quality of recent graduates, a reduction in artisanal mining, and an increasing demand for a skilled workforce by enterprises in the agriculture sector. This will be achieved by improving TVET education so that it more closely aligns with rural labor market demands, increasing the communication with private sector employers to gain input for curriculum and program development, and creating partnerships between the private sector and TVET institutions.

There is strong potential for scaling up different aspects of the proposed projects. Agriculture related curriculum designed for the secondary schools or for certificate courses could be used by other schools and programs in Katanga and throughout the country. A strong food processing industry could collaborate with other mines working in the area and a wide network of local farmers, as well as serve the food demands of other provinces. These possibilities, however, assume several important factors, such as stability in the region and government policies that do not discourage agricultural entrepreneurs.

Appendix 1: List of those interviewed/visited

Kinshasa:

Mon-Wed: August 11 – 13, 2014

USAID/Kinshasa: various people: Jim Gilman, Patrick Smith, Martin McLaughlin, Lothempo Vindtjou, Alex Newton, and Richard Robinson

Thursday: August 14, 2014

JICA: Kuniyuki Furuta, Chef de Bureau; and Olivier Diemby; Directeur Adjoint de Programmes.

DfID (Adam Smith, Elan Project): Laura Rovamaa, Flexible Facility Manager; Alexandre Diouf Senior MRM Manager; Syntich Tshibanda, Analyste de Marchés; Alexandre Diouf, Senior MRM Manager.

Office de Promotion des petites et moyennes Entreprises (OPEC), Ministère d'Industrie, M. Jean Pierre, Directeur; Kateyiblia Kashala Kate, Assistant du Directeur General ; and Tshiamala Claude Sous - Directeur de la Formation

Agence Belge de Développement (CTB): Jean-Luc Mutombo-Mudiay, Senior Program Officer.

Friday: August 15, 2014

USAID: Richard Robinson

Lubumbashi:

Saturday: August 16, 2014

Inspection Provinciale de l'Agriculture, Pêche et Elevage: Dr. Baudin Kadudji Kabemba, Chef de division.

Ministère Provincial de l'Enseignement: Benjamin Kasonde Ekakamwisa, Chef de division d'enseignement; Kayembe Bizy, Inspecteur Provincial Principal.

Division Provinciale des Affaires sociales, actions humanitaires et solidarité national: Nicodème Nguza Yav, Chef de Division Provinciale.

BIT (Bureau International du Travail) – PJAEK : Mutombo Kyamakosa Modeste, Coordinateur National.

Sunday: August 17, 2014

Centre ARRUIPE: Ferdinand Muhigirwa, Managing Director.

Monday: August 18, 2014

Gécamines Headquarters: BAKASANDA Jeannot, Directeur de l'Enseignement. Education

Ministry (revisit)

Fungurume: TFM

Freeport-McMoRan Copper Gold:

Megan Kuefler, Senior Community Development Specialist
Yannick Simon, Director of Community Relations
Shari Knoerzer, Director, Social Responsibility and Community Development Africa/Asia

Tenke Fungurume Mining:

David Clayton, Community Development Manager
Horst-Dieter (H-D) Garz, General Manager, Plant Operations

Tuesday: August 19, 2014

Fungurume: TFM field tour

Kolwezi:

Institut Mutoshi: Arthur Jano Bakasanda N.L., Directeur du Département des Stratégies de l'Enseignement Général et Technique; Mulowela Tshibamb Jean Marie, Directeur, Division de l'enseignement Technique, Gécamines

Kayumba Nzita Kiba le Prefet, Institut Professionel Chua, Makonga Lucia Anselme Service Analyse et Etudes Pedagogiques

Wednesday: August 20, 2014

Congo Equipment, Jacob

GlenCore (Kamoto Copper Company): Francesca, Regional CSR Advisor.

Mulungwishi:

Katanga Methodist University: Mbundj Kayemb, Bibliothecaire;

Lubumbashi:

Thursday: August 21, 2014

Don Bosco (Salésiens): R.P. Jean Claude Ngoy, Supérieur Provincial des Salésiens de Don Bosco et Représentant Légal

Institut Technique Salama: Father Dieudonné Makola, Rector Cité des

Jeunes: Frere Dieudonne Kabongo, Rector

Bureau Diocésian de Développement, Lucienne Mukandilwa

Congo Equip Staff: Charles Tashereau, Directeur Général, and Eamon Doyle, Chief Operations Officer

Tractafic: Walter Burls, After Sales Manager

Friday: August 22, 2014

Governor's school/College Technique Mwapusukeni: Max Senker Musam-Adia Si, Recteur Popaul Kingolo

Mbemba, Owner, Kim Poultry

Centre de Recherche Agro-Alimentaire (CRAA)

Monday: August 25, 2014

International Rescue Committee: Valery Manegabe.

Kinshasa

Tuesday: August 26, 2014

The World Bank: Sabiti Kalindula, Education Specialist AFTEW

USAID Outbriefing: Diana Putnam, Director USAID/DRC; Jim Gilman, Patrick Smith, Richard Robinson, Aubert Kakudji Mwilambwe, and others

Wednesday: August 27, 2014

VVOB Workshop: Jan Fransen, Education Advisor TVET; Paul Bottelberge, Gestionnaire de Programme.

Appendix 2: TVET Statistics

Number of secondary school students enrolled in each subject

	Subject	Total	Boys	Girls	% Girls
1	Accounting	18569	11210	7410	40%
2	General Mechanic	3907	3754	156	4%
3	Sewing (long course)	3324	847	2477	75%
4	Electricity	2365	2233	123	5%
5	IT	1835	983	835	46%
6	Auto Mechanic	1805	1577	228	13%
7	Sociology	829	564	265	32%
8	Agriculture	621	465	154	25%
9	Sewing (short course)	489	21	468	96%
10	Construction	340	340	0	0%

Source: Katanga Provincial Education of EPSP (primary, secondary and professional education) 2012-2013

Note: This is the list of the top 10 subjects by enrollment

Number of schools offering each subject

	Subject	Number of Schools
1	Accounting	335
2	Sewing	213
3	General Mechanics	137
4	Electricity	93
5	Auto Mechanic	89
6	IT	68
7	Electronics	23
8	Agriculture	21
9	Sociology	15
10	Construction	12

Source: Katanga Provincial Education of EPSP (primary, secondary and professional education) 2012-2013

Note: 47 subjects possible, 20 are not taught in any schools, all other subjects are offered in fewer than 15 schools

Number of male and female students enrolled at each level of education

	Schools	Boys	Girls	% Girls	Total
Kindergarten	426	16923	17465	51%	34388
Primary	1473	299213	269996	47%	569209
Secondary	832	123672	89595	42%	213267
Total	2731	439808	377056	46%	816864

Source: Katanga Provincial Education of EPSP (primary, secondary and professional education) 2011-2012

Number of male and female teachers at each level of education

	Male	Female	% Female	Total
Kindergarten	0	1207	100%	1207
Primary	8376	4251	34%	12627
Secondary	9018	1293	13%	10311
Total	17394	6751	28%	24145

Source: Katanga Provincial Education of EPSP (primary, secondary and professional education)

Male and Female Enrollment in Gécamines Secondary Technical Schools in Katanga (11 total schools)

Year	Boys	Girls	Total	% Girls
1	787	360	1147	31%
2	614	235	849	28%
3	579	268	847	32%
4	419	213	632	34%
5	328	98	426	23%
6	141	61	202	30%
Total	2868	1235	4103	30%

Source: Gécamines 2014

Appendix 3: TVET Institutions in Katanga

Key Questions	Name: Mutoshi (Gécamines)	Name: Governor's School Mwapusukeni	Name: Institut Technique Salama (ITS)
Number and gender of students by program	About 20% are girls (182 students/ 932 was girls last school year). Many of them study in Industrial program and electronics		No girl in secondary level but about 40% in computer program at university level
Number and gender of instructors by program	About 10% of instructors are women (4/42) and are teaching in industrial chemistry and electronics programs	In TVET programs only 1 instructor is women (Engineer in machine tools)	No woman instructor but 4 administrative staff
Types of training programs offered	Industrial chemistry; general mechanics; electronics	Auto-mechanics; metal construction; electricity; Other programs tailored to industry as requested	Auto-mechanics; general mechanics; printing; electricity;
What is the sense of professional purpose within the institution?	Good national examination results indicating successful teaching program	New school	Good national examination results indicating successful teaching program
Describe the institutional governance structure	Gécamines directorate, a school director and teachers	Private school run by the Jesuits. School Director assisted by two staff	Public school run by the Peres Salesians, school director, section heads, teachers
Describe faculty incentive systems	Salary is quiet low (fees has been recently doubled); short-term training; four bags of flour;	Salary is the highest in Lubumbashi;	Salary from federal state, supplemented by province,

Key Questions	Name: Mutoshi (Gécamines)	Name: Governor's School Mwapusukeni	Name: Institut Technique Salama (ITS)
Are graduates finding (agricultural) employment quickly?	Before, but not so good recently	Not yet (new school)	Not in agriculture, in other programs pupils have (mechanics, electricity and electronics) the chance to be recruited is quiet high
Describe the educational on-campus infrastructure.	old solid buildings; out-of-date machinery for instruction;	New buildings; equipment being acquired; new laboratories already constructed	old buildings, workshops, and garage; used equipment still functional
What are the primary sources of funding?	Student fees; Katanga province occasionally; and some mines	Foundation; student fees;	Student fees; mechanical services rendered;
Are there opportunities for internships and field experiences?	Internships for all students;	Internships and training are expected	Student employment; internships

Additional TVET schools in Katanga

Cité des Jeunes (Lubumbashi-Salesian)
 Mulungwishi (Methodist tech/univ)
 Institut national de préparation professionnelle (INPP)
 Chemchem Center
 Institut Uhodari
 Centre professionnelle de la Ruashi (ex-Solvay)
 woodworking school – Lukotola (near to Fungurume)

Centre professionnelle de Manika (Kolwesi)
 Institut Vyombo-Likasi
 Ecole supérieure d'Ingénieurs (UniLu)
 Department of Agricultural Economics (UniLu)
 Ecole agricole – Kolwesi (orthodox)
 Ecole technique de Bunkeya (Fungurume)